



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/616,492      | 07/08/2003  | Yao-Sheng Lee        | 074361.00015        | 9712             |

7590 11/28/2005

Harvey S. Kauget  
Holland & Knight LLP  
Suite 4100  
100 N. Tampa Street  
Tampa, FL 33602-3644

|          |
|----------|
| EXAMINER |
|----------|

TRAN, BINH X

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

1765

DATE MAILED: 11/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

yf

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/616,492             | LEE, YAO-SHENG      |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Binh X. Tran           | 1765                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 13 September 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 8-20 is/are pending in the application.
- 4a) Of the above claim(s) 15-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 8-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 8-20 are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 8-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanabe et al. (US 2003/0066817) in view of Pierson et al. (US 2001/0025826).

Respect to claim 8, Tanabe discloses anisotropically dry etching a vertical feature in a semiconductor substrate, method comprising the steps of:

depositing a mask on the semiconductor substrate (resist mask or SiO<sub>2</sub> mask, paragraph 0067, 0085);

maintaining the temperature of the semiconductor substrate in the vacuum chamber about 250 °C (read on "above 160 °C", paragraph 0061, 0065, 0067);

igniting a plasma in a vacuum chamber;

etching the semiconductor substrate with a gas comprising HBr (aka hydrogen bromide) (paragraph 0085).

Tanabe fails to disclose the step of forming a nitrogen containing layer on the semiconductor substrate from a nitrogen containing gas. In a semiconductor etching process, Pierson teaches to use nitrogen containing gas to form nitrogen containing layer (i.e. passivation layer) to promote sidewall passivation and preventing lateral

Art Unit: 1765

attack (paragraph 0017, 0062). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Tanabe in view of Pierson by forming a nitrogen containing from a nitrogen containing gas because this layer will promote sidewall passivation and preventing lateral attack.

Respect to claims 9-10, both Tanabe and Pierson discloses the semiconductor substrate includes InP-base compound (Tanabe's paragraph 0065; Pierson's paragraph 0038). Respect to claims 11-12, both Tanabe and Pierson discloses the step of performing the etching process with an inductively coupled plasma etching system (Tanabe's paragraph 0001, Fig 1, Fig 11; Pierson's paragraph 0033-0034). Respect to claim 13, Tanabe discloses the etching rate in the range of 1-5  $\mu\text{m}/\text{min}$  (Fig 6). Respect to claim 14, Tanabe discloses the pressure is greater than 0 Pa and less than 4 Pa (fig 3D, 0-30 mTorr, within applicant's value).

### ***Response to Arguments***

3. Applicant's arguments with respect to claims 8-14 in page 3 of the remark have been considered but are moot in view of the new ground(s) of rejection. Specifically, the applicant's argue that Tanabe fails to disclose the new limitation of the amended claim 8 (i.e. the step of "forming a nitrogen containing layer on the semiconductor substrate from a nitrogen containing gas"). This argument is persuasive but is moot in view of the new grounds of rejection base on Tanabe in view of Pierson.

### ***Conclusion***

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X. Tran whose telephone number is (571) 272-1469. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

Application/Control Number: 10/616,492

Page 5

Art Unit: 1765

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Binh X. Tran

**NADINE G. NORTON**  
**SUPERVISORY PATENT EXAMINER**

A handwritten signature in black ink, appearing to read 'Norton', located below the printed name and title of the Supervisory Patent Examiner.